

THE MINERAL INDUSTRIES OF MOROCCO AND WESTERN SAHARA

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MOROCCO

Morocco was the world's third leading producer of phosphate rock after the United States and China. In addition to phosphate mining by the state-owned Office Cherifien des Phosphates (OCP), a wide range of minerals, which included barite, clays, coal, cobalt, copper, fluorspar, gold, iron ore, lead, nickel, petroleum, salt, silver, talc, and zinc, also were produced in Morocco. Mining accounted for about 1.6% of the gross domestic product (GDP). In 2003, the GDP at current prices was estimated to be about \$44.5 billion;¹ the GDP based on purchasing power parity valuation was \$120.6 billion. Located in northwest Africa and bounded by Algeria, the Atlantic Ocean, the Mediterranean Sea, and the non-self-governing territory of Western Sahara, this 446,550-square-kilometer country had a population estimated to be about 30.1 million in 2003 (Direction de la Statistique, 2004b§;² International Monetary Fund, 2004§; Jasinski, 2004§; U.S. Central Intelligence Agency, 2004§).

Trade

According to Morocco's Department of Statistics, total Moroccan exports were valued at about \$8.8 billion in 2003 compared with about \$7.9 billion in 2002. Crude and processed petroleum, mineral ores, processed mineral-based commodities accounted for about 15% of total exports. According to preliminary data from the Ministry of Energy and Mines, exports of precious and refined metals and processed mineral-based commodities were valued at more than \$1 billion; these included phosphoric acid and purified phosphoric acid, about \$510 million; fertilizers (diammonium phosphate, monoammonium phosphate, and trisodium phosphate), about \$374 million; silver, \$39 million; refined lead, about \$35 million; cobalt cathode, \$27 million; and gold, \$23 million. Crude mineral exports were valued at \$443 million; these included phosphate rock, about \$373 million; zinc, \$28 million; barite, about \$12 million; and fluorite, about \$10 million. In 2003, Morocco began to export copper sulfate; the country's iron ore exports, however, were negligible, and, owing to strikes, exports of manganese were halted. According to the United Nations, Moroccan petroleum exports were valued at \$227 million (Direction de la Statistique, 2004a§; Ministère de l'Energie et des Mines, 2004§; United Nations, 2004§).

Morocco and the United States continued Free Trade Agreement discussions. The U.S. Census Bureau reported that Moroccan exports to the United States in 2003 were valued at \$385 million. These included about \$70 million of nonmetallic minerals, more than \$22 million of petroleum products, about \$5 million of organic chemicals and fertilizers, and about \$2 million of semifinished iron and steel mill products. Imports from the United States were valued at more than \$468 million in 2003 and included coal, \$18 million; petroleum products, about \$9 million; and iron and steel mill products, \$6 million (U.S. Census Bureau, 2004a§, b§).

According to the Department of Statistics, total Moroccan imports were valued at about \$14.3 billion in 2003 compared with \$11.9 billion in 2002. Mineral commodity imports included crude petroleum, \$964.7 million; petroleum products, \$707.2 million; coal, \$173.2 million; and cement, about \$8.7 million (Direction de la Statistique, 2004a§; United Nations, 2004§).

Structure of the Mineral Industry

In July, the Government's National Office of Hydrocarbons and Mining (ONHYM) was formed through the merger of the National Office of Oil Research and Exploration (ONAREP) and the Office of Mining Research and Participation (BRPM). ONHYM is responsible for the exploration for and the promotion of national mineral resources and has equity interest in several mining companies. OCP managed phosphate mining and beneficiation and owned most of the phosphoric acid and phosphate fertilizer production facilities.

Private sector companies, whose ownership included domestic and international companies, played a significant role in the mineral industry. Groupe ONA of Morocco was the leading indirect private sector investor through its equity interest in Managem S.A and Société Nationale d'Investissement S.A. A number of medium- and small-sized local firms were active in the industrial minerals sector. There were 3,196 mining permits, of which 2,761 were for metals; 273, for clay; and 97, for salt. Petroleum exploration permits and reconnaissance licenses were held in joint ventures between the state-owned ONHYM and subsidiaries of international companies. ONHYM and the Société Anonyme Marocaine de l'Industrie Raffinage (Samir) produced petroleum and natural gas.

¹Where necessary, values have been converted from Moroccan dirhams (MDh) to U.S. dollars (US\$) at the average exchange rate of MDh9.503=US\$1.00 for 2003 and MDh10.976=US\$1.00 for 2002.

²References that include a section mark (§) are found in the Internet Reference(s) Cited sections.

Commodity Review

Metal

Cobalt.—Compagnie de Tifnout Tiranimine (CTT), which was a subsidiary of Managem, mined cobalt ore at Bou Azzer and produced cobalt cathode at Guemassa. CTT's cobalt chemicals plant at Guemassa, which started pilot operations in December 2002, produced 72,559 kilograms of calcined cobalt oxide in 2003. The REMINEX Group, which was the research subsidiary of Managem, started a prefeasibility study of the production of lithium-cobalt oxide (Africa Mining Intelligence, 2004).

Gold.—Because of problems with ground control and structural complexity, Akka Gold Mining, which was a joint venture of Managem (70% equity interest) and BRPM (30%), produced about 30% less gold from the Iourim Mine during 2003 than during 2002 (Managem, S.A., 2004, p. 13).

Iron and Steel.—Société Nationale de Sidérurgie (Sonasid) awarded construction contracts for a 650,000-metric ton-per-year (t/yr)-capacity steel plant to Danieli & C. Officine Meccaniche S.p.A. of Italy and the Techint Group of Italy. Sonasid started site preparation for the 120-metric-ton (t) electric arc furnace (EAF) facility at Jorf Lasfar. Initially, the furnace was scheduled to operate for 19 hours per day with a 56-minute tap-to-tap cycle. The plant was expected to produce its first crude steel in 2005; output was earmarked for Sonasid's 300,000-t/yr-capacity Jorf Lasfar and 480,000-t/yr-capacity Nador rolling mills. In 2003, Sonasid continued the rehabilitation of its Nador rolling mill (Société Nationale de Sidérurgie, undated§; Danieli & C. Officine Meccaniche S.p.A., 2003§).

Lead and Zinc.—In 2003, Compagnie Minière de Guemassa (CMG), which was a subsidiary of Managem, added production from the 620 level of the main deposit of the Hajar Mine and from the 520 level of the northeast deposit to its output, but technical problems resulted in significantly less-than-expected lead and zinc production; lead production declined by 23%, and zinc production declined by almost 24%. CMG continued development of the Drâa Sfar zinc deposit and exploration at Guemassa, Haouz, and Jbeilet. In 2003, CMG also increased production of zinc oxide from its Guemassa facility to 10,195 t from 1,306 t in 2002 (Managem, 2004, p. 12, 19).

The country's other major lead producer, Compagnie Minière de Touissit (CMT), closed the Touissit Mine in 2002 but continued production of lead-silver and zinc-silver concentrates from the Tighza Mine. The reduced availability of domestic lead concentrates adversely affected the Moroccan lead refiner, Société des Foundries de Plomb de Zellidja, which was a subsidiary of Zellidja S.A. of Morocco. During 2003, Zellidja experienced additional technical problems with its program to expand the production capacity of the company's refinery to 160,000 t/yr from 100,000 t/yr (Groupe Nord Est, 2004a, b; Zellidja S.A., 2004).

Manganese.—In March 2003, the Government announced a 22-company privatization program. This program initially included BRPM's 42.99% interest in Société Anonyme Chérifienne d'Etudes Minières (Sacem); the Government, however, removed Sacem from the privatization program in May. In late October 2002, economic troubles caused Sacem to cut hours and wages at the Imini manganese mine. A strike ensued and continued through 2003.

Silver.—Despite the infrastructure improvements made in 2002, production of silver by Société Metallurgique d'Imiter (SMI) decreased by 21% in 2003. The drop was attributed to a decline in ore grade. In 2003, the company worked on additional projects to expand mine capacity. SMI also reported that it improved ore-treatment procedures (Société Metallurgique d'Imiter, 2004).

Industrial Minerals

Fluorspar.—In 2003, the fluorspar production of the country's leading producer dropped by 21% compared with that of 2002. To counter the exhaustion of minable material on the older production levels of the mine, Société Anonyme d'Enterprises Minières (Samine), which was a subsidiary of Managem, focused on the development of the East K deposit. This had the effect of diverting mine equipment and personnel to the removal of waste rock instead of using them to produce fluorspar. For safety reasons, Samine ceased mining the remaining pillars in the older production areas of its El Hammam Mine. In addition, the mine was closed for 2 weeks in May because of flooding (Managem, 2004, p. 12-13).

Phosphate Rock.—A 3-year \$150 million expansion program was announced by OCP. The program proposed to renovate the phosphate rock washing plant of the Sidi Daoui Mine at the Khouribgha mining center and to nearly double the capacity of the Youssoufia Mine at the Gantour mining center. OCP also proposed to build new fertilizer plants at Jorf Lasfar: a 850,000-t/yr-capacity diammonium phosphate plant and a 400,000-t/yr-capacity single superphosphate plant (Africa Mining Intelligence, 2003).

Mineral Fuels

Samir operated a petroleum hydroskimming refinery at Mohammedia and a topping plant at Sidi Kacem. A November 2002 flood and fire severely damaged the Mohammedia refinery. Restoration of the refinery continued through 2003. Because of the fire, Samir restructured the Mohammedia refinery expansion program that initially had been tendered in 2002. In the 2003 bidding program, Samir requested bids only on the conversion of the Mohammedia refinery to a hydrocracking process. The proposed increase of the production capacity to 160,000 barrels per day (bbl/d) from the pre-fire capacity of about 125,000 bbl/d was designated as the second phase of the refinery upgrade. The request for bids on Phase 2 was rescheduled to 2010. In late 2003, Samir and the Government opened discussions about the future of the Mohammedia refinery after another petroleum storage tank fire. The Government

suggested that the refinery be moved or that a new facility be built to replace the existing plant (Africa Energy Intelligence, 2003b; Middle East Economic Digest, 2003, 2004).

Infrastructure

In September, the Moroccan Government's National Electricity Office and Red Eléctrica de España, S.A. of Spain agreed to install two electrical power cables beneath the Straits of Gibraltar and, in December, the Governments of Morocco and Spain reportedly agreed to build a 39-kilometer railway tunnel beneath the Straits (African Energy Intelligence, 2003a; International Railway Journal, 2003§).

References Cited

- Africa Energy Intelligence, 2003a, Agreement with Spain on interconnection: Africa Energy Intelligence, no. 353, September 17, p. 6.
Africa Energy Intelligence, 2003b, Refinery plan axed: Africa Energy Intelligence, no. 356, October 29, p. 5.
Africa Mining Intelligence, 2003, Major outlay for phosphates: Africa Mining Intelligence, no. 72, November 5, p. 2.
Africa Mining Intelligence, 2004, Managem puts money on hydrometallurgy: African Mining Intelligence, no. 83, April 14, p. 1.
Groupe Nord Est, 2004a, Résultats 1er semestre 2004: Paris, France, Groupe Nord Est press release, September 15, 2004, 3 p.
Groupe Nord Est, 2004b, Résultats 2003: Paris, France, Groupe Nord Est press release, March 10, 2 p.
Managem, S.A., 2004, Rapport annuel 2003: Casablanca, Morocco, Managem, S.A., 40 p.
Middle East Economic Digest, 2003, Bids awaited for revised Samir refinery upgrade: Middle East Economic Digest, v. 47, no. 42, October 17, p. 16.
Middle East Economic Digest, 2004, Samir refinery upgrade clears hurdle: Middle East Economic Digest, v. 48, no. 21, May 21, p. 13.
Société Metallurgique d'Imiter, 2004, Communiqué financier: Casablanca, Morocco, Société Metallurgique d'Imiter press release, 1 p.
Zellidja S.A., 2004, Communiqué: Casablanca, Morocco, Zellidja S.A. press release, 1 p.

Internet References Cited

- Danieli & C. Officine Meccaniche S.p.A., 2003 (June 30), New steelmaking plant at Sonasid, Morocco, accessed December 9, 2004, at URL http://www.danieli.com/press_release/2003/guignol/gui_07.html.
Direction de la Statistique, 2004a, Opérations avec l'extérieur, accessed December 6, 2004, at URL <http://www.statsitc-hcp.ma/morocco11.html>.
Direction de la Statistique, 2004b, Territoire et population, accessed December 6, 2004, at URL <http://www.statsitc-hcp.ma/morocco1.html>.
International Railway Journal, 2003 (December 15), Spain-Morocco rail link agreed in principle, accessed March 30, 2004, via URL http://www.railjournal.com/latenews_archive.html.
Jasinski, S.M., 2004, Phosphate rock, in *Metals and minerals*, v. I of U.S. Geological Survey Minerals Yearbook 2003, accessed December 6, 2004, at URL http://minerals.usgs.gov/minerals/pubs/commodity/phosphate_rock/phospmyb03.pdf.
International Monetary Fund, 2004 (September), World economic outlook database, accessed September 29, 2004, at URL <http://www.imf.org/external/pubs/ft/weo/2004/02/data/index.htm>.
Ministère de l'Energie et des Mines, 2004, Evolution de la production minière, accessed April 27, 2004, via URL http://www.mem.gov.ma/MN/statistiques/statistique_minieres_trimestrielles/Stat_4t_03_web.htm.
Société Nationale de Sidérurgie, [undated], Nador site, accessed December 9, 2004, at URL http://www.sonasid.ma/site_nador.html.
United Nations, 2004, Morocco-Statistical Database, accessed December 8, 2004, via URL <http://www.un.org>.
U.S. Census Bureau, 2004a, U.S. exports to Morocco from 1999 to 2003 by 5-digit end-use code, accessed December 8, 2004, at URL <http://www.census.gov/foreign-trade/statistics/product/enduse/exports/c7140.html>.
U.S. Census Bureau, 2004b, U.S. imports from Morocco from 1999 to 2003 by 5-digit end-use code, accessed December 8, 2004, at URL <http://www.census.gov/foreign-trade/statistics/product/enduse/imports/c7140.html>.
U.S. Central Intelligence Agency, 2004, Morocco, World Factbook 2004, accessed December 6, 2004, at URL <http://www.odci.gov/cia/publications/factbook/geos/mo.html>.

WESTERN SAHARA

In 2003, the United Nations continued its years-long effort to organize a referendum to allow the approximately 267,000 inhabitants of Western Sahara to choose between independence or integration with Morocco. All trade and economic activities in the 266,000-square-kilometer Western Sahara territory were administered by the Moroccan Government (U.S. Central Intelligence Agency, 2004§).

The open pit phosphate rock mine at Boucraa and associated beneficiation facilities in Laayoune dominated the mineral industry of Western Sahara. OCP's subsidiary, Phosphates de Boucraâ S.A. (Phosboucraa), operated the mine, beneficiation plant, and shipping facilities. OCP increased its equity interest in Phosboucraa to 100% after it acquired the remaining 35% equity interest from a Spanish holding company. Western Sahara phosphate production data are included in the Moroccan data in table 1.

In 2003, Fusion Oil & Gas NL of Australia evaluated offshore Western Sahara acreage for the Saharawi Arab Democratic Republic, which was the Government-in-exile for the Polisario Front (Popular Front for the Liberation of the Saguia el Hamra and Rio de Oro). ONAREP had awarded oil exploration permits for essentially the same area to Kerr-McGee Corp. of the United States (the Boujdour block) and Total S.A. of France (the Dakhla block) in 2001.

Internet Reference Cited

- U.S. Central Intelligence Agency, 2004, Western Sahara, World Factbook 2004, accessed December 10, 2004, at URL <http://www.odci.gov/cia/publications/factbook/geos/wi.html>.

TABLE 1
MOROCCO AND WESTERN SAHARA: PRODUCTION OF MINERAL COMMODITIES ¹

(Metric tons unless otherwise specified)

Commodity ²	1999	2000	2001	2002	2003 ^c
METALS					
Antimony:					
Concentrate, gross weight	600	--	--	--	--
Sb content	250	--	--	--	--
Sodium antimonate	478	548	436	532	500
Cobalt:					
Concentrates, gross weight	9,488	14,341	15,725	16,896	16,178 ³
Co content	863	1,305	1,300 ^e	1,300	1,300
Metal ^d	472	967	1,337	1,200 ^e	1,350
Copper:					
Concentrates, gross weight	25,260	23,150	19,120	17,799	17,539 ³
Matte, gross weight	2,212	2,117	1,580	2,016	2,505 ³
Cu content, concentrates and matte	7,747	7,080	5,800	5,000 ^r	4,900
Gold kilograms	--	505	1,191	2,746	1,863 ³
Iron and steel:					
Iron ore:					
Gross weight	6,625	6,462	7,976	8,736 ^r	4,019 ³
Fe content ^c	3,600	3,500	4,300	800	2,200
Metal:^c					
Pig iron	15,000	15,000	15,000	15,000	1,500
Steel, crude	5,000	5,000	5,000	5,000	5,000
Lead:					
Concentrate:					
Gross weight	114,184	117,535	110,906	88,581	54,779 ³
Pb content	79,900	81,208	76,747	75,000	38,000
Cupreous matte, Pb content ^c	600	600	500	600	600
Metal:					
Smelter, primary only	65,209	66,812	58,178	71,840	62,000
Refined:					
Primary	65,209	66,812	58,178	71,840	61,473 ³
Secondary ^c	3,000	3,000	3,000	3,000	3,000
Total ^c	68,000	70,000	61,000	75,000	64,000
Manganese ore, largely chemical-grade	29,150	25,830	13,757	18,064	-- ³
Mercury ^c	10	10	10	9	9
Nickel content of nickle sulfate	--	84	151	109	126 ³
Silver:					
Ag content of concentrates and matte kilograms	51,197	43,200 ^e	42,400 ^e	57,000 ^e	30,000
Ag content of mine and smelter bullion do.	226,692	246,204	238,043	220,000 ^e	170,000
Total do.	277,889	289,000 ^e	280,000 ^e	276,789	200,528 ³
Zinc concentrate:					
Gross weight	216,197	201,692	174,831	178,476	136,433 ³
Zn content	111,703	103,064	89,339	91,000	70,000
INDUSTRIAL MINERALS					
Arsenic trioxide	2,000 ^e	4,426	6,026	5,469	6,872 ³
Barite	328,945	343,557	471,102	469,934	356,394 ³
Cement, hydraulic thousand tons	7,530	8,100	10,000 ^e	10,200 ^e	10,400
Clays, crude:					
Bentonite	36,528	43,152	71,741	58,754	71,544 ³
Fuller's earth (smectite)	21,956	30,665	40,664	43,243	14,944 ³
Montmorillonite (ghassoul)	2,750	2,476	2,270	2,329	927 ³
Feldspar	1,112	6,052	8,979	19,401	20,000
Fertilizers thousand tons	2,111	2,441	2,719	2,602	2,542 ³
Fluorspar, acid-grade	83,100	76,991	96,500	94,911	81,255 ³
Gypsum ^e	450,000	475,000	550,000	600,000	600,000 ³
Mica	210	1,897	--	--	--
Phosphate rock:					
Gross weight ⁵ thousand tons	22,163	21,463	21,983	23,041	22,877 ³
P ₂ O ₅ content do.	7,500	7,200	7,400	7,700	7,400
Phosphoric acid do.	2,696	2,732	2,819	2,921	2,930

See footnotes at end of table.

TABLE 1--Continued
MOROCCO AND WESTERN SAHARA: PRODUCTION OF MINERAL COMMODITIES ^{1,2}

(Metric tons unless otherwise specified)

Commodity ²	1999	2000	2001	2002	2003 ^c
INDUSTRIAL MINERALS--Continued					
Salt: ⁶					
Rock	156,158	147,960	194,000 ^e	226,000 ^e	200,000
Marine ^e	40,000	40,000	40,000	40,000	36,000
Total	196,000 ^e	188,000 ^e	233,816	266,064	236,443 ³
Strontium minerals, celestite	--	7,539	1,879	3,780	2,700
Talc and pyrophyllite	14,655	12,522	27,246	39,612	1,959 ³
MINERAL FUELS AND RELATED MATERIALS					
Coal, anthracite	129,200	30,810	1,908	322	214 ³
Gas, natural:					
Gross million cubic meters	44	50	49 ^e	48 ^e	48
Dry ^e do.	39	44	43	42	42
Petroleum:					
Crude ⁷ thousand 42-gallon barrels	81	97	95 ^e	91 ^e	90
Refinery products:					
Liquefied petroleum gas do.	3,100	2,800	2,710	2,690	1,000
Gasoline do.	3,800	3,800	2,960	3,210	1,500
Jet fuel do.	2,200	2,200	900	1,090	500
Kerosene do.	800	800	880	620	300
Distillate fuel oil do.	18,700	18,000 ^e	21,970	17,330	9,000
Residual fuel oil do.	16,700	16,000 ^e	16,000	14,000	7,000
Other do.	5,300	5,000 ^e	1,500	1,450	700
Total do.	50,600	48,600 ^e	46,920	40,390	20,000

^c Estimated, estimated data are rounded to no more than three significant digits; may not add to totals shown. ^r Revised. -- Zero.

¹ Includes data available through September 2004.

² In addition to the commodities listed, perlite and a variety of crude construction materials are produced, but information is inadequate to make estimates of output levels.

³ Reported figure.

⁴ Cobalt electrowon from cobalt concentrates and tailings from the Bou Azzer Mine.

⁵ Reported production from Morocco and Western Sahara.

⁶ May include production from Western Sahara.

⁷ Series for 1999 to 2000 is based on reported crude oil and condensate production, in metric tons, as follows: 1999--11,085, and 2000--13,106.